#28 Appeal Brief

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

12/9/02 V Hart

Ex Parte Cherng
Appeal No. _____

Applicant:	Tzyh-Chyang Cherng and Yu Zhang
Serial No.:	09/160,991
Filed:	September 25, 1998
Art Unit:	3724
Examiner:	Hwei-Sui Payer
Title:	**CUTTING DIE AND METHOD OF FORMING**
Attorney Ref. No.:	BERL-18A

Cincinnati, Ohio December 9, 2002

Commissioner of Patents and Trademarks
Washington, D.C. 20231

BRIEF ON APPEAL

I. Real Party in Interest

The real party in interest in this appeal is Bernal International, Inc. of Rochester, Michigan, the assignee of the present invention.

II. Related Appeals and Interferences

There are no related appeals or interferences known to Appellant, the Appellant's legal representative, or to the assignee which will directly affect or be directly affected by or have a bearing on the decision of the Board in the present appeal. However, Appellant has copied claims verbatim from issued U.S. Patent No. 5,855,149 to Islam et. al. for the purpose of

AF/3724

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Assistant Commissioner for Patents, Washington, D.C. 20231 on December 9, 2002

Kristi L. Davidson

Kristi L. Davidson, Reg. No. 44,643

12/9/02

Date

Part of #28

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Cincinnati, Ohio 45202 December 9, 2002

Assistant Commissioner of Patents
Washington, DC 20231

Sir:

TRANSMITTAL OF APPEAL BRIEF

1. Transmitted herewith in triplicate is the APPEAL BRIEF in this application with respect to the Notice of Appeal filed on October 9, 2002.

2. STATUS OF APPLICANT

[X] other than a small entity
[ ] small entity

VERIFIED STATEMENT:
[ ] attached
[ ] already filed

3. **FEE FOR FILING APPEAL BRIEF**

Pursuant to 37 CFR 1.17(f) the fee for filing the Appeal Brief is:

[ ] small entity	$160
[X] other than small entity	$320

Appeal Brief fee due $320.00

4. **EXTENSION OF TIME**

Applicant petitions for an extension of time under 37 CFR 1.136 for the total number of months checked below:

	Extension (months)	other than small entity	Fee for small entity
___	one month	$ 110.00	$ 55.00
___	two months	$ 400.00	$200.00
___	three months	$ 920.00	$460.00
___	four months	$1,960.00	$980.00

Fee: $_____

If an extension of time is required please consider this a petition therefor.

(a) [ ] An extension for _____ months has already been secured and the fee paid therefor of $_____ is deducted from the total fee due for the total months of extension now requested.

Extension fee due with this request $_____

or

(b) [X] Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that Applicant has inadvertently overlooked the need for a petition and fee for extension of time.

5. **TOTAL FEE DUE**

The total fee due is:

Appeal Brief fee:	$ 320.00
Extension fee (if any):	$ 0
Total Fee Due:	**$ 320.00**

6. **FEE PAYMENT**

[X] Attached is a check in the sum of $320.00.
[ ] Charge Account No. 23-3000 the sum of _____, a duplicate of this transmittal is attached.

7. **FEE DEFICIENCY**

[X] If any additional extension and/or fee is required, this is a request therefor and to charge Account No. 23-3000. A duplicate of this transmittal is attached for that purpose.

and/or

[X] If any additional fee for claims is required, charge Account No. 23-3000. A duplicate of this transmittal is attached for that purpose.

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invoking an interference, which copied claims stand rejected and are part of the present appeal. Should an interference be declared, Appellant will be the senior party.

III. Status of the Claims

Claims 1-22, 24-27 and 29-31 are currently pending and are subject to this appeal. Claims 1-7, 10, 12-~~13~~ 14, 16-22, 24, 27 and 29-31 are rejected under 35 U.S.C. § 103(a) as being obvious over Baker U.S. Patent No. 3,952,179 in view of Maybon U.S. Patent No. 5,580,472. Claims 8, 9, 11, 15, 25 and 26 are rejected under 35 U.S.C. § 103(a) as being obvious over Baker and Maybon as applied to claims 1, 10, 13 and 22 above, and further in view of Cox et al. U.S. Patent No. 5,417,132.

Claims 1-12 were originally filed upon filing of Application Serial No. 08/602,379 on February 16, 1996. Claims 1-12 were rejected in the Non-Final Office Action mailed on March 26, 1998. A continuation application was then filed on September 25, 1998 containing original claims 1-12, and was accorded Application Serial No. 09/~~439,210~~ 160,991. Claims 1-12 were rejected in the Office Action mailed on August 25, 1999 (Paper No. 5). Appellant filed a Continued Prosecution Application on January 5, 2000, together with a Preliminary Amendment in which Claims 13-15 were added, which were copied verbatim from U.S. Patent No. 5,855,149 granted January 5, 1999 to Islam et al. and assigned at issue to National Research Council of Canada. Claims 13-15 correspond to Islam's claims 1, 2 and 4, respectively. Claim 16 was added, which substantially corresponds to at least Islam's claim 1. Claims 17-19 were also added, with claims 17 and 18 being presented as possible counts for an interference.

Claims 1-12 were rejected and claims 13-19 withdrawn in the Non-Final Office Action mailed on July 20, 2000 (Paper No. 11). The rejections were traversed and new claims 20-27 were added in Appellant's Amendment filed on October 17, 2000. The prior grounds of rejection of claims 1-12 were withdrawn and new grounds of rejection made against claims 1-12 and 20-27 in the Non-Final Office Action mailed on January 4, 2001 (Paper No. 13), with claims 13-19 remaining withdrawn. On July 5, 2001, Appellant filed a Response in which claims 1-7, 10, 12-13, 15-16, 20-22, 24 and 27 were amended, claim 23 was cancelled, and claims 28-29 were added. Three declarations were submitted as secondary evidence of non-obviousness. A Non-Final Office Action was mailed August 17, 2001 (Paper No. 16), but was not received. The Non-Final Office Action was re-mailed November 6, 2001 (Paper No. 17), in which the prior grounds of rejection were withdrawn, and new grounds of rejection made against claims 1-22 and 24-29, such that copied claims 13-19 were no longer withdrawn. The Examiner gave no consideration to the secondary evidence. On February 6, 2002, Appellant filed a Response to the Non-Final Office Action, amending claims 1-4, 17-18, 20-22 and 24, cancelling claim 28 and adding claims 30-31. Consideration of the previously-filed declaration evidence was requested.

Claims 1-22, 24-27 and 29-31 were rejected in the Final Office Action mailed March 7, 2002 (Paper No. ~~20~~ 21), and again, no consideration was given to the secondary evidence. On June 7, 2002, Appellant filed a Request for Continued Examination together with a Response to the Final Office Action, traversing the rejections and again requesting consideration of the previously-filed declaration evidence. A Final Office Action was mailed July 16, 2002 (Paper No. 24), maintaining the previous grounds of rejection and finally commenting on the previously-filed declaration evidence. A Response to the Final Office Action was transmitted on

September 24, 2002 traversing the grounds of rejection. An Advisory Action maintaining the rejection of all pending claims was mailed on October 3, 2002 (Paper No. 26). Appellant filed a Notice of Appeal on October 9, 2002.

IV. Status of Amendments

There are no amendments pending.

V. Summary of Invention

The present invention relates to a method of forming a cutting die using laser cladding to build up the blade on the die body. The blade material is different than, and harder than, the die body material. The blade material is clad onto an area of the die body surface by heating the area with the laser and introducing the blade material into the area while heating the area. Thereby, the blade is built outwardly from the surface of the die body and is integral therewith. Depending on the height of the blade and amount of blade material deposited per pass, the blade may be built with a single deposition pass of the laser, or may be built up by multiple successive deposition passes of the laser. The blade material may have a hardness at the time of deposit equivalent to the final desired hardness of the blade, or may be deposited with a lower hardness than desired, followed by heat treating or cryogenic treating to increase the hardness to the final desired hardness. In summary, each of the claims recite the following elements:

- heating an area of a die body surface with a laser
- introducing blade material into the heated area while heating the area

- building the blade outwardly from the die body surface, integral therewith
- using blade material that is compositionally different and of greater hardness than the material forming the die body surface
- after cladding, shaping/sharpening the cladded blade.

Claims 1, 3-12, 17 and 29-31 broadly apply to use of single or multiple deposition passes of the laser to build the blade. Claim 2 specifies depositing the blade material by a single pass of the laser. Claims 13-16, 18-22 and 24-27 specify depositing the blade material in multimultiple passes of the laser.

A main difficulty in the manufacture of cutting dies, addressed by the present invention, is the formation of hard cutting blades on a die body formed from relatively soft, inexpensive material. (See, for example, pg. 4, lines 5-7). Historically, cutting blades on rotary dies have been formed by machining, heat treating and/or welding techniques. One technique involved forming the die body from a soft material, then machining away large portions of the surface to leave the blades extending from the surface, such as by milling, and subsequently hardening the surface including the extended blades. (See, for example, pg. 3, lines 1-2). This technique did not work because of distortion and cracking in the areas around the blades, believed to be due at least in part to thermal deformation and phase transformation deformation resulting from differential cooling rates between the relatively low mass blades and high mass die body, and between the surface and the interior of the die. (See, for example, pg. 3, line 2 to pg. 4, line 4 and pg. 4, lines 9-11).

Another technique involved first heat-treating the die to bring the surface to the requisite hardness, followed by machining the blades. (See, for example, pg. 2, lines 4-10). The

machining required the removal of large amounts of hard surface material to leave the small blades extending from the surface. Milling techniques were not feasible due to the high hardness, and thus electric discharge machining (EDM) was required, which is a slow, painstaking, expensive process. Given the size of the die, and large amount of material to be removed, the EDM process could take days to complete. (See, for example, pg. 2, lines 10-21 and pg. 4, lines 7-9).

Yet another technique involves welding a hard blade material onto the soft die body. The welding process, such as TIG/MIG welding, produces a large "puddle" of melted metal as a result of the inability to focus and control the heat applied from the welding tool. A large amount of heat is put into the surface of the workpiece surrounding the weld, which causes high surface distortion, annealing of the surrounding area, and cracking of the die body and blade. The welding process also induces a large amount of residual stress in the die body and blade, which can cause cracking and corrosion. Distortion and residual stress also will cause the blade to actually move during operation of the cutting die, which causes tolerance problems. In addition, the welding process creates large, wide beads or "globs" of welding material that are hard to control with respect to defining a precise shape and providing accuracy and consistency. To produce a blade by welding, the deposited material must be subjected to significant machining after deposition due to the general messiness of the process. Thus, you still need to deposit a material that has lower hardness than the requisite blade hardness to enable the extensive machining, followed by heat treating the shaped blades. Also, the welding process is not able to deposit alloys with a high volume percentage of hard carbides on dies effectively and successfully. A significant amount of cracking occurs in the die body and blade when high alloys

are deposited by known welding techniques. Thus, in the relatively messy welding process, damage occurs to the die due to the high, uncontrolled, unfocused heat used by the welding tool, followed by a significant machining step to remove large amounts of excess cladding material, and finally a hardening treatment for making the blade suitable for use, the success of which is highly dependent on the composition of the cladding material.

The present invention, as set forth in the claims on appeal, uses a laser cladding technique in which the die surface is heated and hard, wear resistant blade material is laser cladded into the heated area. Lasers have the advantage of a well-defined and localized beam by which the amount of heat/energy applied to the surface of the die can be controlled. Surface distortion, annealing and cracking can be minimized due to the localized nature of the applied heat. Little to no residual stress is induced in the die body and blade. The bond with the die surface is also more uniform than with welding due to the high controllability of the laser cladding process.

Moreover, the laser cladding technique is capable of producing small beads of material that can be accurately controlled for consistent quality and a near net shape deposit that requires far less subsequent machining to obtain the blade shape than welding processes. Near net shape is a term of art referring to a shape that is close to the final desired shape, and which requires only a small amount of material removal. Thus, the fact that the material is of high hardness in the as-deposited state is of little significance with respect to machining as compared to the prior art welding technique due to the low excess of material that must be removed to shape the blade. Welding processes include rough machining (substantial material removal) and finish machining (small material removal) to define the cutting edge. The shaping step in the

present invention is finish machining by virtue of the near net shape deposit achieved by laser cladding. Only a small amount of material need be removed. (See, for example, page 8, lines 12-20). Thus, Appellant discovered that laser cladding can be used to deposit hard, wear resistant materials in a near net shape to form a fully functional blade on a cutting die of softer, less expensive material thereby eliminating the extensive machining required with welding techniques, limiting or eliminating the need for subsequent hardening of the blade, and avoiding cracking and the like while gaining the benefit of less expensive base material.

VI. The Issues

(1) Whether the Examiner's rejection of claims 1-22, 24-27 and 29-31 under 35 U.S.C. § 103 over the combination of Baker in view of Maybon, and over the combination and further in view of Cox et al. is in error; and

(2) Whether the Examiner's rejection of claims 1-22, 24-27 and 29-31 under 35 U.S.C. § 103 is proper in view of the declarations submitted in rebuttal of the finding of obviousness.

VII. Grouping of Claims

The rejected claims on appeal (1-22, 24-27 and 29-31) should be grouped as one group.

VIII. Argument

The Claims Are Not Obvious Over The Prior Art Of Record

The Examiner has failed to make a *prima facie* case of obviousness under 35 U.S.C. § 103 and the rejections should be reversed.

> To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. MPEP § 2143.

The combination of Baker in view of Maybon, forms the basis for all of the current rejections over prior art. The Examiner's position is that Baker discloses cladding a hard blade on a cutting die, but using a different heat source. Baker deposits weld beads on the tubular die surface, and then machines the weld bead to form the blade. Appellant discussed in detail above the inability of welding technology to produce near net shape blades. This is confirmed by the extensive machining requirements required in the Baker patent in FIGS. 3-8 and the accompanying text. Maybon uses a laser heat source for resurfacing, which the Examiner reasons may be substituted for the welding source in the Baker patent to thereby render obvious the presently claimed invention.

The Examiner states that "the sole difference between Baker '179 and the claimed invention resides in the heat source used for cladding" and that "use of laser as a heat source is well known in the art as evidenced by the Maybon reference." With all due respect to the Examiner, Appellant believes this is an extreme oversimplification of the present factual situation. Baker uses known welding technology to produce hard blades on a relatively soft die body. Welding techniques first ~~from~~ form a molten metal, then deposit globs or beads of the molten

metal onto the die body using high, uncontrolled, unfocused heat. The welding technique is incapable of producing near net shapes, and extensive machining must be used to define the cutting blade. (See Baker Col. 3, lines 39-61.) It is clear from Baker that he is only interested in precisely and accurately locating the weld bead on the die surface, and then relies on extensive rough and finish machining to conform the bead to a cutting blade. Further, Maybon does not relate to the cutting die industry, but rather relates to hardfacing or resurfacing the tops of ridges on a paper pulp defibering or refining plate. There is simply no teaching, suggestion, motivation, or problem or solution recognition in the prior art or elsewhere that would have led one of ordinary skill in the art to combine the references.

The claims of the instant application are directed to forming a cutting die with a blade that is integral with and extending outwardly from the die body surface by building the blade outwardly from the surface by cladding with a laser. Thus, the blade, not just a resurfaced top portion of the blade, is formed by laser cladding. Maybon is directed to resurfacing the tops of ridges on a paper pulp defibering or refining plate. As discussed by Maybon in Col. 1, the plates are made of cast iron or stainless steel and have a large number of ridges separated by grooves. The problem faced by Maybon is that "[t]he ridges on the plates tend to wear down with use, due to the abrasive effect of the paper pulp fibers . . . ." (Col. 1, lines 30-34.) Regarding the basic idea or solution of his invention, Maybon says the invention is "to resurface the top of the ridges selectively using an appropriate abrasion resistant material, retaining for the base of the ridges and the bottom of the grooves a material which favors flow of paper pulp" and "to resurface only the tops of the ridges of the plates by means of a laser beam in association with a powder injector." (Col. 2, lines 15-19 and 29-31, emphasis added.) Thus, the ridge is first cast

or otherwise formed integrally with the plate body from a first material, then a second, abrasion resistant material is added to the tops only of the ridges. Thus, the ridge and groove topography is first formed, and then in a second step, a small amount of hardfacing material is added to the already formed ridges by matching the laser path to the raised topography and adding to the topography. Accordingly, Maybon adds nothing to Baker in solving the problem respecting formation of the whole blade with a material different from that of, and on a relatively large mass of, the die body. Maybon does not teach ridge or blade forming on a planar body surface from different material than the body. Maybon does not teach forming the entire ridge topography by laser cladding. Maybon specifically avoids forming the entire ridge of the abrasion resistant material, thereby teaching against the present invention.

> A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention." MPEP § 2141.02 citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 U.S.P.Q. 303 (Fed. Cir. 1983), *cert denied*, 469 U.S. 851 (1984).

One skilled in the art, looking to Maybon, would be led away from building the whole blade outwardly from the die body surface because Maybon teaches leaving the lower part of the ridge integral with and of the same material as the plate body and only adding harder material to the top of the ridge.

For further explanation showing the secondary patent reference teaches against the invention, and referring to FIG. 16 of the Maybon patent, the plate body 8 includes ridges 9-12 and grooves 13-15, and the ridges 9-12 include a lower part 20-23 and an upper part 16-19. Maybon states that: "[t]he stainless steel or cast iron plate body 8 forms the lower part 20 to 23 of the respective ridges 9 to 12 and the bottom 24 to 26 of the respective grooves 13 to 15" (Col. 5,

lines 1-3) and "[t]he body of the plate, the lower part of the ridges and the bottom of the grooves can be made from cast iron or stainless steel. This retains the good surface properties of stainless steel or cast iron in the groove bottoms to facilitate flow of the paper pulp in said grooves" (col. 2, line 65 to col. 3, line 2). The upper part 16-19 only is formed by laser resurfacing. As an example, Maybon states that the upper part of the ridges usually has a height of around 1 mm and the lower part of the ridges is usually about 6-8 mm high. (Col. 5, lines 4-7.) Thus, the majority of the ridge extending outward from the plate surface is of the same material and integral with the plate body, and only a small top portion comprises the laser-deposited material.

The metallurgical bond formed in the Maybon article is achieved between the top part of the ridge and the lower part of the ridge, not between the plate body surface and the ridge. This is clearly a resurfacing method, not a blade building method as in the present invention. A method as in the Maybon patent for hard surfacing an existing feature does not constitute a teaching of building the feature itself. Maybon first forms a major portion of the ridge by casting, then forms a minor top portion by laser cladding. The present invention forms the entire blade by laser cladding and no part of the blade is formed by casting methods.

The presently claimed invention builds a small blade on a large die body by laser cladding wherein the whole blade is of a different material than the die body and the whole blade is metallurgically bonded to the die body surface such that it is integral therewith. While laser resurfacing may eventually be used for the die blades of the present invention, after use and wear of the die blades, the claims of the instant application are directed to the initial formation of the whole blade by laser cladding, which is not taught, and is in fact taught against, by Maybon.

Maybon teaches against the method of the present invention, and therefore cannot be said to render it obvious.

If one modifies Baker by applying the teachings of Maybon, as a whole, one only gets a tubular die with a bottom portion of the blade cast with the tubular die body, and a tip portion of the blade resurfaced with harder material. In accordance with Maybon's teachings, the whole blade will not be comprised of the abrasion resistant material. One cannot pick and choose only parts of Maybon where there is no suggestion for doing so. Thus, the combination of Baker with Maybon is improper and incapable of suggesting the invention specifically claimed here. Not even the combination if deemed suggested would produce the invention. Thus, the rejection should be reversed.

It would appear that the Examiner reasons that hard blades on soft die bodies are known, welding is known as a heat source, and lasers are ~~knew~~ known as a heat source, and therefore, the claimed invention is obvious. "Because there is 'a general rule that combination claims consist of combinations of old elements as well as new elements' . . . , '[t]he notion . . . that combination claims can be declared invalid merely upon finding similar elements in separate prior patents would necessarily destroy virtually all patents and cannot be the law under the statute, § 103.' " *Ruiz v. A.B. Chance Co.*, 57 U.S.P.Q.2d 1161, 1167 (Fed. Cir. 2000) (citing *Clearstream Wastewater Sys. v. Hydro-Action, Inc.*, 206 F.3d 1440, 1446, 54 U.S.P.Q.2d 1185, 1189-90 (Fed. Cir. 2000); *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1575, 1 U.S.P.Q.2d 1593, 1603 (Fed. Cir. 1987); *Arkie Lures, Inc. v. Gene Larew Tackle, Inc.*, 119 F.3d 953, 957, 43 U.S.P.Q.2d 1294, 1297 (Fed. Cir. 1997)). Appellant suggests that the Examiner is basing her rejection on the concept that each element of the claimed invention is old,

and therefore the invention must be obvious. "The 'each-element-is-old' approach has been resoundingly rejected." *Pacific Technica Corp. v. U.S.*, 3 U.S.P.Q.2d 1168, 1180 (Cl. Ct. 1986) (citing *Amstar Corp. v. Envirotech Corp.*, 730 F.2d, 1476, 221 U.S.P.Q. 649 (Fed. Cir. 1984)). The courts have clearly stated that "[t]he test is not whether one device can be an appropriate substitute for another," *Ruiz*, at 1167, but rather whether "the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." *In re Dembiczak*, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999). "Likewise, there must be something in the prior art as a whole suggesting the desirability and obviousness of making the combination." *Pacific Technica*, at 1180. "Focusing on the obviousness of substitutions and differences instead of on the invention as a whole . . . [is] a legally improper way to simplify the difficult determination of obviousness." *Ruiz*, at 1167 (citing *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1383, 231 U.S.P.Q. 81, 93 (Fed. Cir. 1986)). Appellant respectfully asserts that the Examiner has been focusing improperly on the substitution of a laser heat source for a welding heat source, and ignoring the invention as a whole.

In accordance with the Federal Circuit decision of *In re Dembiczak*, the analysis of patentability under § 103 requires the "critical step of casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field" to avoid the "tempting but forbidden zone of hindsight." *In re Dembiczak*, at 1616-1617. A rigorous application of the requirement for a showing of the teaching or suggestion or motivation to combine prior art references is critical because "combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art

to defeat patentability–the essence of hindsight." *Id.* Appellant respectfully suggests that the Examiner has employed hindsight in order to arrive at the finding of obviousness of the pending claims including those copied verbatim from an issued patent.

Baker is directed to the problem of producing hard blades on a cutting die, and the solution in Baker is to use welding techniques, followed by extensive machining. While lasers have been used for hardfacing, there is no suggestion in the references as a whole or elsewhere that lasers can be substituted for welding techniques to produce an entire blade pattern on the surface of a cutting die, nor that they present a solution to the prior problems faced by Appellant. Both the laser technique itself and the result of the laser technique are distinctly different than welding. Welding is deposition of a molten metal which is melted prior to deposition, while laser cladding deposits a powder material with melting occurring by the laser just prior to or simultaneous with the powder's introduction onto the surface. Laser and welding heat sources are not the same in operation or effect, and thus, are not obvious substitutes as the Examiner maintains. The Examiner reasons that she is using Maybon only for the purpose of teaching a laser as a heat source, thereby ignoring the remaining teachings of the reference, as well as the field of application for those teachings. When considered as a whole, as all references should be, Maybon merely teaches laser hardfacing of cast ridges on a pulp refining plate, and teaches against full formation of the ridges by the laser. Maybon does not address the problem of full blade formation on a cutting die, and does not suggest that welding and laser hardfacing are interchangeable techniques. There is nothing in the references as a whole that would suggest to one of ordinary skill in the cutting die industry to look to the field of hardfacing cast ridges on paper refining plates for a solution to the problem of die blade formation, nor does the Maybon

reference provide a solution. Maybon only teaches hardfacing. Thus, Maybon is not clearly pertinent to the particular problem with which the inventors were involved, and does not teach or suggest the substitution that the Examiner makes.

Appellant respectfully asserts that it is improper to pick and choose those features of a reference that are helpful and ignore the teachings of the reference as a whole. "Each prior art reference must be evaluated in its entirety, and all the prior art must be evaluated as a whole." *Hughes Aircraft Co. v. U.S.*, 8 U.S.P.Q.2d 1580, 1584 (Cl. Ct. 1988). "It is impermissible to disregard portions of a prior art reference that teach away from an invention, [a]nd at all costs, the mistake of picking random bits of various prior art references and employing them as a 'mosaic to recreate a facsimile of the claimed invention' must be avoided." *Id.* at 1586 (citing *Akzo, N.V. v. United States Int'l Trade Comm'n* 808 F.2d 1471, 1481, 1 U.S.P.Q.2d 1241, 1246 (Fed. Cir. 1986), *cert. denied*, 107 S.Ct. 2490 (1987); *W.L. Gore & Assoc. v. Garlock, Inc.*, 721 F.2d 1540, 1550, 220 U.S.P.Q. 303, 311 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984)). Considering each reference as a whole, and the prior art as a whole, there is no teaching, suggestion or motivation to combine the references to arrive at the present invention. Because the Examiner bears the burden of establishing a case of *prima facie* obviousness, and that burden has not been met, as set forth above, Appellant respectfully requests that the rejections be reversed.

Secondary Evidence is Sufficient to Rebut a Finding of Obviousness

Customer accolades and declarations from Mr. Gregg Harrison, Mr. Graham Bell, and Mr. Paul Madill were submitted as secondary evidence for the purpose of rebutting the

obviousness rejection. The evidence submitted constitutes strong evidence of the non-obviousness of the present invention. The statements or accolades are from customers of Bernal International, specifically Mr. Gregg Harrison of Mead Packaging and Mr. Graham Bell of Shorewood Packaging, who have purchased and are using cutting dies made in accordance with the teachings of the present application, as claimed, and as verified by Mr. Madill of Bernal International. Because of the process used, Appellant was able to focus on selection of the materials based upon their ultimate function. Because the blade can be deposited with the requisite hardness and having a composition different than the base material as appropriate for its function without regard to machining difficulties, long die life can be achieved. Distortion, cracking and tolerance problems are solved by the present invention, resulting in a cutting die that exhibits consistency, accuracy and longevity in use as a direct result of the claimed process. As set forth in the enclosed statements, the cutting dies made in accordance with the claimed invention have met a long felt need in the industry for increased blade life and have met with significant success by those using the product. Mr. Harrison and Mr. Bell both discussed the increased die life that has been experienced in their plants through use of the cutting dies of the present invention. Both customers stated that they have experience longer die life than with any other cutting die currently available. The declaration of Mr. Madill sets forth the nexus between the evidence of success and the claimed invention.

Appellant respectfully suggests that the evidence of superior results, commercial success and long felt but unsolved need was effectively ignored by the Examiner without a careful analysis of its relevancy. In this regard, Appellant further suggests that the Examiner did not consider the evidence in the proper light. First, the Examiner concludes that Mr. Madill's

affidavit is of very little probative value because (1) he failed to give competitive figures for sales for the entire market and thus does not establish commercial success; (2) he failed to establish the nexus between the commercial success and the inventive features because he does not carry his burden under the standard set up in In re Caveney; and (3) he has not shown under the standard set forth in In re Heldt that commercial success alleged is not due to other factors such as promotion, advertising, etc. Second, the Examiner concludes that Mr. Harrison's and Mr. Graham's statements are of very little probative value because (1) they merely provide a statement alleging an increase in die life; (2) they fail to demonstrate unexpected results or properties; and (3) they fail to compare the closest prior art relied upon (citing In re Brown and In re Chapman). (See Paper No. 24) These comments makes clear that the Examiner has not properly considered the purpose or content of the affidavit and statements, and did not consider the Madill affidavit in combination with the customer accolades. The affidavit of Mr. Madill is submitted for the purpose of establishing the nexus between the customer statements and the claimed invention. Mr. Madill is simply testifying that the dies referred to in the customer statements were made in accordance with the claimed invention, such that the accolades given by the customers can be attributed directly to the claimed invention. Mr. Madill's affidavit cannot be considered in a vacuum as if it alone were meant to establish non-obviousness. It is clearly to be considered in combination with the customer statements as a means by which the nexus is provided.

Appellant fails to understand the Examiner's requirement that Mr. Madill give competitive sales figures, as the purpose of the customer statements is to establish that the dies made in accordance with the claimed invention provide superior results in the nature of

significantly increased die life compared to all other rotary dies now or previously used by those customers, and that the increased die life has a significant impact on the productivity of their plant operations. Appellant further fails to understand the requirement that Mr. Madill show that commercial success is not due to other factors such as advertising and promotion. While that requirement may have been applicable in In re Heldt, which involved evidence in the nature of increased sales, the requirement has no applicability to the present evidence. The customer statements are directed to those customer's actual experience of increased die life, and such increased die life will be present regardless of whether Mr. Madill's company engages in no promotion/advertising or extensive promotion/advertising.

Regarding In re Caveney, cited by the Examiner, the difference between the present invention and the prior art is the technique by the which the blades are formed, and it is the blades that wear down causing the need for repair. The increased die life obtained by the dies of the present invention, as addressed by the customer statements, is thus attributable to a difference in the blades on the dies of the present invention and blades on the dies of the prior art. The difference in the blades, again, is the method of building them, i.e., laser cladding. Therefore, the superior results exhibited by the dies of the present invention are directly attributable to the difference of the claimed invention compared to the prior art. Thus, the present facts are not correlative with those in In re Caveney.

The Examiner states, with respect to Mr. Harrison and Mr. Bell, that they "merely provide a statement alleging an increase die life of the present invention" and they "fail to demonstrate unexpected results or properties." The MPEP (see § 716.02(a)) provides that evidence of unobvious or unexpected advantageous properties, such as superiority in a property

the claimed invention shares with the prior art, can rebut *prima facie* obviousness. All rotary cutting dies have a wear life for the blades. The statements by Mr. Harrison and Mr. Bell assert that the dies of the claimed invention have superior wear life compared to all other dies that they are using, i.e., dies of the prior art. Mr. Harrison and Mr. Bell set forth the advantages obtained by increased wear life, including increased productivity and huge cost savings for their plants. This type of evidence of commercial success and long felt but unsolved need may be different than the type of evidence typically encountered by the Examiner, but that does not make it irrelevant as objective indicia of unobviousness. The superior results related to blade wear life compared to prior die blades are unobvious and of great commercial practical significance, as evidenced by the affidavit and statements of Mr. Harrison, Mr. Bell and Mr. Madill. Thus, Appellant respectfully requests that finding of the Examiner, that the secondary indicia of non-obviousness is of little probative value, be reversed.

CONCLUSION

For the reasons stated, Appellant respectfully urges the Board to reverse the rejection of claims 1-22, 24-27 and 29-31.

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APPENDIX OF CLAIMS

1. A method of forming a cutting die including a die body and an integral blade extending outwardly from a surface of said die body, the method comprising the steps of:

cladding a blade material onto an area of said die body surface by heating said area with a laser, introducing said blade material into the heated area while heating said area, and building a blade of said blade material outwardly from said surface, wherein said blade material is compositionally different and of greater hardness than a base material forming said die body surface; and

shaping the cladded blade.

2. A method as in claim 1 wherein said cladding step includes:

heating said area of said die body surface; and

introducing said blade material into the heated area while heating said area and building said blade of said blade material outwardly from said surface in a single pass of said laser.

3. A method as in claim 1 wherein the die body surface is cylindrical and including heating said area with said laser and introducing said blade material into the heated area while heating said area to completely build said blade on said cylindrical die body surface.

4. A method as in claim 1 including introducing cladding powder comprising a carbide into the heated area while heating said area for building said blade.

5 . A method as in claim 1 wherein said shaping step includes shaping said blade by electrical discharge machining.

6. A method as in claim 1 wherein said shaping step includes shaping said blade by milling.

7. A method as in claim 1 wherein said shaping step includes shaping said blade by grinding.

8. A method as in claim 1 including the further step of heat treating said blade.

9. A method as in claim 1 including the further step of cryogenic treating said blade.

10. A method as in claim 1 wherein said cladding step includes:

scanning a laser beam along said die body surface comprising a low grade material of less than about 60 Rockwell C hardness, in a path corresponding to a desired blade pattern;

melting said die surface along said path; and

introducing a carbide-containing high grade material of at least about 60 Rockwell C hardness into said path while heating said path to build up a die blade in said pattern.

11. A method as in claim 10 including heat treating said die blade after said shaping to harden said die blade.

12 . A method as in claim 1 wherein said introducing step includes introducing cladding powder selected from the group consisting of D2 steel, CMP10V steel, CMP15V steel and a nickel based superalloy with 30-40% volume fraction tungsten carbide.

13. A process for producing a cutting die having a metal base which carries a sharpened ridge extending along a predetermined path thereon, said ridge being of a composition distinct from said base, comprising the steps of;

a) moving a laser beam along said path to heat the metal base and simultaneously supplying powdered metal having a composition distinct from said base to said predetermined path via a tube moving concurrently with said laser beam so that said laser beam melts a thin layer of the metal base along said path and also melts the metal powder being delivered to the base and thus forms a band of fused metal powder along said path,

b) repeating steps a) so as to heat and melt a thin layer of the previously deposited metal along with additional metal powder to form an additional layer metallurgically bonded to the first layer, and

c) repeating step b) to produce multiple layers until a ridge of metal is formed along said path, said ridge having a substantially uniform height and width, and

d) sharpening the ridge so formed to suit it for use in cutting.

14. A process according to claim 13, wherein the metal base is cylindrical, the process including rotating the base to provide one component of relative motion between said base and said laser beam.

15. A process according to claim 13, wherein after said sharpening step, said ridge is heat treated using heat from said laser beam.

16. A process for producing a cutting die having a metal base which carries a sharpened ridge extending along a predetermined path thereon, said ridge being of a composition distinct from said base, comprising the steps of;

a) moving a laser beam along said path to heat the metal base and simultaneously supplying powdered metal having a composition distinct from said base to said predetermined path via a tube moving concurrently with said laser beam so that said laser beam melts a thin layer of the metal base along said path and also melts the metal powder being delivered to the base and thus forms a band of fused metal powder along said path,

b) repeating steps a) so as to heat and melt a thin layer of the previously deposited metal along with additional metal powder to form an additional layer metallurgically bonded to the first layer, and

c) repeating step b) to produce multiple layers until a ridge of metal is formed along said path, and

d) sharpening the ridge so formed to suit it for use in cutting.

17. A process for forming a cutting die comprising the steps of:

cladding a blade material onto a die surface of a material different than said blade material to form a blade extending outwardly from said surface, said cladding step including the steps of heating an area of said die surface, and introducing blade material into the heated area while heating said area and building a blade of said different blade material outwardly from said surface; and

shaping the cladded blade.

18. A process for forming a cutting die comprising the steps of:

cladding a blade material onto a die surface to form a blade extending outwardly from said surface, said cladding step including the steps of heating an area of said die surface, and introducing blade material into the heated area while heating said area in at least two layers and building a blade of said material outwardly from said surface; and

shaping the cladded blade.

19. The process of claim 18, wherein the die surface is made of a material different than the blade material clad thereon.

20. A method of forming a cutting die including a die body and an integral blade extending outwardly from a surface of said die body, the method comprising the steps of:

cladding a blade material onto an area of said die body surface by heating said area with a laser, and by depositing said blade material into the heated area while heating said area in multiple successive layers to form a blade extending outwardly from said surface, wherein said blade material is compositionally different and of greater hardness than a base material forming said die body surface and wherein said blade has a hardness equivalent to the final desired hardness of said blade; and

after said cladding step, shaping the cladded blade.

21. A method of forming a cutting die comprising the steps of:

depositing a carbide-containing blade material in multiple successive layers onto a cylindrical die surface by laser cladding with a material feeder coaxial with a laser beam to form a cladded blade extending outwardly from said surface, wherein said blade material is compositionally different and of greater hardness than a base material forming said die surface; and

after said depositing step, shaping the cladded blade.

22. A method of forming a cutting die comprising the steps of:

heating an area of a cylindrical die surface in a path corresponding to a desired blade pattern including intersecting blades;

depositing a layer of blade material into said path while heating said area by laser cladding, wherein said blade material is compositionally different and of greater hardness than a base material forming said die surface;

repeating the step of depositing blade material onto a preceding layer of blade material until a blade of desired thickness is formed extending outwardly from said surface in said pattern; and

after said blade of desired thickness is formed, shaping the blade.

24. A method as in claim 22 including heating said area with said laser and introducing a carbide-containing blade material into the heated area while heating said area and building a blade having a hardness equivalent to the final desired hardness of said blade.

25. A method as in claim 22 including a further step of heat treating said blade after said shaping.

26. A method as in claim 22 including a further step of cryogenic treating said blade after said shaping.

27. A method as in claim 22 wherein said depositing steps include:

scanning a laser beam along said die surface comprising a low grade material of less than 60 Rockwell C hardness, in the path corresponding to the desired blade pattern;

melting said die surface along said path; and

introducing a carbide containing high grade material of at least 60 Rockwell C hardness into said path while heating said path and repeating the scanning along said path to build up a die blade in said pattern.

29. The method as in claim 1 wherein building said blade is in a pattern including intersecting portions.

30. The method as in claim 1 wherein said introducing step includes feeding said blade material by a feeder coaxial with a beam of said laser to heat said blade material while heating said area.

31. The method as in claim 1 wherein said die body is cylindrical, the method including rotating said die body to provide one component of relative motion between said die body and said laser.